



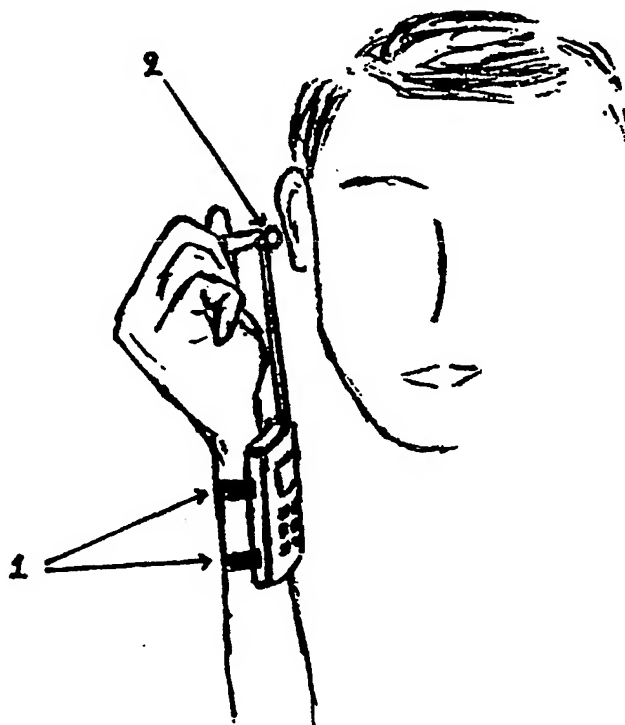
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: WRIST MOBILE PHONE

## (57) Abstract

The "Wrist mobile phone" is a new type of mobile phone, which can be carried fastened to the wrist of the user and during the phase of conversation, the user can speak and hear at the same time, without removing the device from the place where it is fastened. Construction of the "Wrist mobile phone" can be based on the existing technology that is already used in the existing mobile phones, compared to which however, it brings particular changes and modifications, resulting a substantial change in the way of their usage. Major differences of the "Wrist mobile phone" compared to the existing handheld mobile phones are: a) there are one or more straps, which start from the lateral surfaces of the device. The purpose of these straps is that the device can be carried fastened to the wrist of the user. These straps can incorporate a receiving antenna. Alternatively, these straps can be connected on a second removable back surface of the device or on the battery of the device, which is placed in the rear part of the device; b) instead of an incorporated speaker, there is a small external earphone (2) which is connected with the top of an extending mechanism, resembling a retractable antenna (6), which can also work as a receiving antenna, and which is extended from the upper surface of the device (that one facing towards the palm while the device is fastened to the wrist); c) the microphone (4) is placed in the upper part of the device. By extending the retractable antenna (6) and by leading it to his ear, the user of the "Wrist mobile phone", can speak and hear at the same time, without removing the device from the place where it is fastened; d) the time is clearly displayed in the screen (5) during the phase of waiting for a call.



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### Wrist mobile phone

This invention describes a new type of a mobile phone, which can be carried fastened to the wrist of the user and during the phase of conversation, the user  
5 can speak and hear at the same time, without removing the device from the place where it is fastened.

Construction of the **Wrist mobile phone** can be based on the existing technology that is already used in the existing mobile phones, compared to  
10 which however, it brings particular changes and modifications, resulting a substantial change in the way of their usage.

Many companies in the field of electronic industrial products have already managed to produce mobile phones of a small size, taking advantage and  
15 developing the contemporary technology. There is a continuing and ongoing progress in the attempt to shrink these devices. Nevertheless, despite of the fact that the size of the so-called "handheld mobile phones" is already sufficiently small, all of them have the form of a portable unit, which has to be carried out by its owner, by holding it in one of his hands. Alternatively they can be  
20 carried in a special case, which is usually placed in the belt, or by putting them in a bag or a pocket. This form of the mobile phones results some particular disadvantages: A) Handholding them, makes difficult the functionality of one of the hands. Indeed, contemporary human, by keeping busy one of his hands in order to carry his mobile phone, burdens the flexibility of his hands, which was a  
25 substantial advantage that contributed (with his developed mentality of course), in the profound development of the human race, according to some anthropological aspects. B) Access to the mobile phone is usually complicated. Since a unit which is placed in a bag or pocket rings, many movements has to be accomplished (usually urgent and anxious), till the user will be able to replay.  
30 Ringing of the phone can be possibly not heard, if there is much noise in the environment. C) The handheld mobile phone can be easily lost or it can be stolen or it is possible to fall down and to be destroyed. D) During the phase of listening, the unit has to touch the ear of the user. This very close distance of the unit to the human brain has accused that burdens the health of the user, due to  
35 the exposure to the electromagnetic field of the unit. E) The usage of additional accessories bringing an earphone, ("hands free" type), is relatively complicated, as the user has to accommodate long wires.

There is a number of already existing patents that describe devices referring to telephones which can be mounted on the wrist. Olsen U.S. Pat. No 4,847,818 describes a "wristwatch radiotelephone" that brings in the two endings of its straps housings for the speaker and the microphone. This device has to be unfastened from the wrist in order to be used as a telephone. Thorp U.S. Pat. No 5,224,076 similarly describes a "wristwatch radiotelephone" that brings a telescopically extending mechanism, which can bring the microphone of the device in a distance from the main body of the device, where the speaker is placed in a stable position. This device has also to be unfastened from the wrist in order to be used as a telephone. The whole description of this device is substantially differentiated compared to the form of the existing mobile phones. Fernandez W.O. Pat. No 6/33569 describes a wrist device that is a combination of two modules, a personal computer and a mobile phone, which are coupled by means of a bracelet. In this device there is not any mechanism (e.g. extending mechanism of an external speaker) allowing the user to comfortably speak and hear without removing the device from the place where it is fastened. Blonder U.S. Pat. No 5,239,521 describes a "radio telephone in the form of a wristwatch" which has a strap consisted of two layers. The upper layer of the strap brings a speaker and it is connected to the bottom layer in a way that it can be released and rotated, bringing the speaker in the palm and in a distance from a microphone that is found in the bottom strap. Chassabian WO Pat. No 98/27702 describes a "wrist-mounted cellular telephone device". The form of this device is substantially differentiated compared to the form of the existing mobile phones. Its electronic elements and its battery are accommodated within a case that has the form of a bracelet, which is consisted of two C-shaped portions and has a stable diameter. This invention describes an extending of the speaker mechanism, which is consisted of some flat shaped, folded "hinged plates". Alternatively it describes an ear piece mounted at an end of a tube having a securing arrangement for securing to a finger.

Compared to the above, the key idea of the "wrist mobile phone" is based on the following: a) It bases its construction on the typical form of the existing handheld mobile phones requiring only partial modifications, which though, result substantial changes in the way of their usage. b) It integrates the idea of a wrist mounted telephone device that allows the user to speak and hear at the same time without removing the device from the wrist. c) It can be easily separated from the straps transforming to a type of a handheld mobile phone.

Major differences of the "wrist mobile phone" compared to the existing handheld mobile phones are:

5 a) There are one or more straps resembling with those used in the wristwatches, which start from the lateral surfaces of the device. With these straps the "wrist mobile phone" can be fastened to the internal side of the wrist of the user (element 1, figures 1,2 and 3). Depending on the clothes that the user wears, the "wrist mobile phone" can be placed directly on the skin of his wrist, or over thin clothes. (For example, it can be placed over a shirt and under the sleeves of a jacket). Alternatively, these straps can be connected on a second removable back surface of the device or on the battery of the device, which is placed in the rear part of the device (that facing towards the wrist). In this case the device can be easily separated from the straps, by removing the removable back or by changing the battery with an alternative one which does not bring any straps. The straps offer an additional potential except that of carrying the device fastened to the wrist. Straps of a particular construction can incorporate a particularly designed receiving antenna (figure 6).

10 b) In the "wrist mobile phone" there is not any incorporated speaker. Instead of this, there is a small earphone resembling to those that are used in the Walkman. During the phase of listening, this earphone is leaded in the ear of the user (element 2, figures 1,2,3). This earphone is permanently attached on the top of an extending mechanism, resembling to a retractable antenna (element 6, figure 2). This mechanism is extended from the upper surface of the device, (that facing towards the palm), and apart of its role to extend the earphone (2), it can play the concomitant role of the receiving antenna. Below, in the continuation of this description of the invention, this extending mechanism will be briefly called as "retractable antenna (6)" or "antenna (6)". When the device is in the phase of waiting for an incoming call, the antenna (6) is shortened and the earphone (2) is placed in a special housing which is found in the upper place of the device (element 3, figures 2,3). When the user wants to set the fastened on his wrist device in the phase of conversation, he extends the antenna (6) (figure 2). As the earphone (2) is now in a distance of about 10 centimeters from the main body of the device, he leads it with his forefinger towards his ear (figure 1).

25 c) The microphone of the device is placed in the upper surface of the device (element 4, figures 2,3). With this placement the microphone is closer to the mouth of the user, when his finger leads the earphone towards his ear. The user can speak and hear at the same time, without removing the device from the wrist where it is fastened.

d) The device is equipped with software, which additionally provides watch services: When the device is in the phase of waiting for a call, the screen shows clearly the time (element 5, figure 3). With this feature, the device can replace the traditional watch.

5

The "wrist mobile phone" has the following advantages:

- The user can speak and hear at the same time, without removing the device from the place where it is placed and carried, (fastened on the wrist), and without using additional accessories.
- 10 - Hands are free again. Carrying the mobile phone does not keep busy one hand.
- Access to the "wrist mobile phone" is direct. This results in saving time. There are not any missed phone-rings due to the noise in the environment.
- "Wrist mobile phone" is less possible to be stolen or to fall down and to be destroyed.
- 15 - The usage of the "wrist mobile phone" induces less exposure of the human brain to the electromagnetic field of the device, compared to the conventional mobile phones. This happens because the main body of the device is not adjacent to the ear during the phase of conversation. Furthermore, the receiving antenna can also be removed in a distance from the user's head, if we chose the version
- 20 of the antenna that is incorporated in the strap.
- An additional advantage of the "wrist mobile phone" is the restriction of the annoying sound pollution, which is resulted when the existing mobile phones ring. Due to the place where the device is fastened and carried, (the wrist of the user), there will be possible an almost complete replacement of the existing
- 25 sound based ringing system, by a vibration system (similar to those that are already used in the existing mobile phones), or by an incorporated small electric multivibrator, which will create a smooth electric stimulation in order to notify the user.
- The "Wrist mobile phone" can be easily separated from its straps. This would be useful in a circumstance that the user does not want to "wear" the device
- 30 (e.g. dressed with clothes incompatible with the device, he wants his hands to be completely free because he has to do a subtle work).

The figure 3 represents the device when it is in the phase of waiting for an incoming call: The antenna (6) is shortened and the earphone (2) is placed in the special housing (3), which is found in the main body of the device. The screen

35 (5) shows the time.

The figures 1 and 2 represent the device when it is in the phase of conversation. The figure 4 represents how the earphone is electronically connected with the main body of the device, through the tract of the retractable antenna (6).

(Approximate configuration. Exact ratios of the dimensions are not considered).

5 The figure 5 represents how the device is fastened to the wrist.

The figure 6 represents the particularly constructed strap, which incorporates a receiving antenna.

10 Construction of the "wrist mobile phone" can be based on the existing technology. In the figure 3 an approximate ratio of 1:1,8 is used. The dimensions of the existing mobile phone MOTOROLA Star Tag 110 (94x55x19) were considered.

A detailed description of the basic parts of the device follows below:

15 The form of the "wrist mobile phone" is similar to the typical form of the most of the existing mobile phones (parallelepiped consisted of six sides). The two large surfaces (the front one and the rear one) are not completely flat, but they have a slightly bent form (lengthways their longer dimension). Consequently to  
20 this slightly bent form, the device has a better match to the wrist of the user, slightly surrounding it.

The exact size of the "wrist mobile phone" will be depended on the electronic technology on which its construction will be based on. We can compare the size of the "wrist mobile phone" to the size of the existing mobile phones, because  
25 the "wrist mobile phone" does not require any further volume. In contrary, there is a decrease of the size due to the fact that in the "wrist mobile phone" there is not any incorporated speaker. A further decrease of the size can be achieved if the version of the antenna that is incorporated to the strap will be established, instead of the antenna that is incorporated to the main body of the device.

30 (Concerning the receiving antenna, the device offers three alternative possibilities, which are described below).

In the "wrist mobile phone", the incorporated speaker is replaced by a small earphone (2), resembling in the form and size to those which are used in the  
35 Walkman. This earphone is permanently connected through a joint (7), with the top of the antenna (6), which is extended from the upper surface of the device (figure 2).

This antenna (6) is consisted of one or two or more retracting parts of a hollow tube. This tube is consisted of a semi-flexible (but not very flexible) conductible material. The earphone (2), which is placed in the top of the antenna (6), is wired with the main body of the device, through a very thin wire, which is found  
5 across the internal tract of the antenna (6). As the length of this wire has to change according to the length of the retractable antenna (6), there is a very small winding mechanism placed in the foot of the antenna (6). Another technical solution, which can be adopted in this point, is the following: the wiring of the earphone can be incorporated in the wall of the antenna, across its retracting  
10 parts. Two conductible lines (e.g. made by copper) lay across the internal tract of the antenna (6) (figure 4, elements 8,9). These conductible lines are pasted on the internal tract of the antenna (6). Between the material of the antenna and the conductible lines, there is an insulating material (element 10). When the sequential parts of the antenna (6) are extended, the sequential parts of the  
15 above wiring conduct each other, through an appropriate fixing of their poles (element 11).

The earphone (2) will be connected with the upper end of the antenna (6) through a joint (figure 2, element 7), that will allow the movement of the  
20 earphone (2) upwards or downwards with regard to the oblong axis of the antenna (6). Consequently, during the phase of listening, the user will be able to change the inclination of his wrist with regard to the position of his head, while the earphone (2) is in his ear. This event, in combination with the semi-flexibility of the antenna (6), offers convenience and relative freedom of the movements of  
25 the hand that wears the phone, during listening.

The volume of the sound of the earphone (2) will be adjusted by the keys of the main body of the device. Nevertheless, in an advanced version of this earphone, there could be an incorporated volume controller, which could offer an  
30 additional ability to adjust the volume of the sound using the forefinger: In the ridge (backside) of the earphone (2), there will be a small controller, which will have the form of a wheel, which is placed vertically and semi-sunken in the body of the earphone (figure 2, element 15).

35 The keys and the screen will be placed on the front surface of the device in a similar way as in the existing mobile phones. There are the following small differences: The screen (5) is placed in about 10-cm distance bellow the upper end of the front surface of the device (figure 3). In the place that remains



between the screen and the upper end of the front surface, instead of the incorporated speaker, there are placed the following: a) the special housing (3) for the earphone (2) and b) three keys dedicated to the operation of the device. The most important among these keys, is the large "key for the activation and inactivation of the conversation phase" (5), which is placed in the upper - right corner on the front surface of the device. Finally the hole for the microphone (4) is placed in the middle of the upper surface of the device.

The activation of the device from the waiting phase to the conversation phase is accomplished automatically, when the antenna (6) is extended. There are three alternative options for extending the antenna (6). A) Manually: When the user wants to set the device in the phase of conversation, he picks the earphone (2) with the fingers of his other hand and by dragging it upwards, he extends the antenna (6) at the same time. Concomitantly with this movement, the device is set in conversation phase. By retracting the antenna (6), the device comes back in the waiting phase. B) Extension of the antenna (6) can be accomplished with the assistance of a spring that is found in the track of the antenna. During the waiting phase, the antenna (6) is retracted and it is retained in this place by a mechanical manner. When the user wants to set the device in the phase of conversation, he presses a mechanical key (not included in the figures), which releases the antenna (6) from the mechanical retention described above. Consequently, the antenna (6) is extended dragged along by the spring that is found in its track. C) Electrically driven extension of the antenna (6): By pressing the "key for the activation and inactivation of the conversation phase" (5) two concomitant functions take place: 1) the device is set in the phase of conversation and 2) a small electric motor that is incorporated in the device is activated. This electric motor extends automatically the antenna (6). The advantage of the electrically driven extension of the antenna (6) is that only one hand is needed in order the user to answer to a call: that one bringing the device. This can be achieved if the user completely bends his wrist. With a complete bending of the wrist, the little finger can touch and press the "activation key" (5). For an easier accomplishment of the above movement, the "activation key" (5) has a large size (about 0,8-cm diameter). In any case, the fingers of the other hand can also press this key. The retraction of the antenna can be accomplished by double clicking on the same key (5).

As the antenna (6) has to correspond to the forefinger and the "activation key" (5) to the little finger of the hand that brings the device, it is obvious that there

have to be two different versions of the "wrist mobile phones": for the left and for the right hand. The several elements that form the front surface of the device of the "wrist mobile phone for the left hand" will have a "mirror" position compared to those of the "wrist mobile phone for the right hand".

5

As far it concerns the receiving antenna of the "wrist mobile phone", as it is mentioned above, there are three alternative options, (which can also be implemented in combination).

10

A) The retractable antenna (6), which has the concomitant role for the extension of the earphone, as it is described above.

B) A compact antenna incorporated in the main body of the device. A small part of the above antenna comes out of the lower surface of the device (element 16, figure 2).

15

C) An antenna incorporated in the strap. In this case, the strap has to be constructed in a particular way and it will bring an incorporated flexible metal element that will play the role of the receiving antenna. It is possible that the functioning of this type of antenna will be negatively influenced because of the very close distance to the body of the user. For this reason, there will be a second thin and flexible plaque of metal that will underlay to the above antenna and consequently it will come in between the antenna and the body of the user. The role of this underlying plaque will be to restrict the negative influence of the body of the user on the functioning of the antenna. In a vertical section of a strap of this type, bringing an incorporated antenna, we can see the following levels (from the lower one to the upper one) (figure 6). a) The lower coating (17) (e.g. made of thin leather). b) A thin and flexible metal plaque, (18) (e.g. made of copper), that will extend all along the length and the breadth of the strap. c) A thin insulation (19) that will come in between the described as above metal plaque and the antenna. d) The antenna itself. This may have the form of a thin, flexible oblong lamina that will lie all along the length of the strap (figure 6, element 20). Alternatively it will have the form of an externally insulated thin wire that will run across the strap in a vertical direction compared to its oblong axis, from one side of the strap to the other, forming multiple folding of S type (figure 6, element 21). e) The upper coating (22) (e.g. made of thin leather).

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The straps described as above fit together with the main body of the device through a mechanism similar to those used in the straps of the watches. This junction also provides an appropriate adjustment of the two poles of the antenna that project from the end of the strap, with the corresponding terminals that are

found on the surface of the body of the device in this particular place (figure 6, element 23). An accessory strap can replace the entire original strap.

5 The advantage of choosing the type of antenna that is incorporated in the strap is that there is less exposure of the brain to the electromagnetic waves, as this type of antenna is found in a distance from the brain of the user. Furthermore, during the phase of conversation, the antenna of this type is found in a position that is not surrounded by parts of the body of the user. Consequently it has a better signal receiving ability.

10 In the "wrist mobile phones" using the type of antenna that is incorporated in the strap, the retractable mechanism that serves for extending the earphone (2) is again similar to the retractable antenna (6), but it does not play the role of a receiving antenna. Consequently, there is no need to be made of a conductible material.

15 As far it concerns the straps that serve for fastening the "wrist mobile phone" on the user's wrist, they will have an external appearance resembling to the straps of the watches, either they are of a particular construction and they incorporate an antenna or they are simple (element 1, figures 1,2,3). There may be one  
20 central wide strap (element 13, figure 5), or two or more straps. These straps fit together with the main body of the device through a mechanism similar to those used in the straps of the watches: In the side surfaces of the device there are some small projections, two for each strap. Between them there is an axis to which the strap is adjusted (element 14, figure 5). This axis can be removed from  
25 its original position and consequently the strap can change with an accessory one. Even common straps for watches will be possible to be used. In any case, the straps will have to have an adjustable length, so that the device will be able to be wearied either directly on the skin or over some clothes. For this reason, the straps will lock to each other with a bolt, preferably of velctron type,  
30 (without excluding alternative ways, as the traditional way that the straps of the watches lock to each other).

In the "wrist mobile phone", there is the possibility the device to be easily separated from the system of the straps and to be transformed to a device  
35 resembling to the conventional mobile phones, (but with main difference the different type of the speaker). This can be achieved since the straps are not connected on the main body of the device, but on a second removable back surface ("back") of the device. This second removable "back" will have the form

of a flat plastic surface that will have the same dimensions and form with the original back surface of the device (or with a large part of it). This second removable "back" will bring across its two lateral endings a vertical projection resembling with rails. To these rails, a corresponding staple that will be found on  
5 the main body of the device will fit by sliding.

The removable battery of the "wrist mobile phone" will be placed in the rear place of the device, which touches the hand of the user. (Figure 5, element 12). The battery can be removed after untying the device from the wrist. In case that  
10 there is the second removable "back" that is described above, the battery will come in between this second "back" and the main body of the device. Finally, an other choice is that the system of the straps will be connected directly on the battery that is found in the rear place of the device. If we want to rid the device  
15 of the straps, we change the battery with an alternative one that does not bring any straps.

## CLAIMS:

1. A device of a mobile phone, which compared to the conventional handheld mobile phones additionally brings one or more straps (1), with which it can be fastened to the wrist of the user, which straps may bring an incorporated receiving antenna, said device comprising:
- 5 a) Instead of an incorporated speaker, there is a small external earphone (2) which is connected through a joint (7) with the top of an extending mechanism, resembling to a retractable antenna (6), which can work also as a receiving antenna, and which is extended from the upper surface of the device. (The upper surface is that one facing towards the palm while the device is fastened to the wrist).
- 10 b) The straps (1) start directly from the lateral surfaces of the main body of the device, or alternatively they are connected on a second removable back surface of the device.
- 15 2. The device according to the claim 1, wherein the microphone (4) is placed in the upper part of the device.
- 20 3. The device according to the claim 1, wherein the retractable antenna (6) is formed of one or more retracting parts of a hollow tube consisted of a semi-flexible conductible material.
- 25 4. The retractable antenna (6) according to the claim 3, wherein it can be extended with the assistance of a spring that is found in its track. During the waiting phase, the antenna (6) is retracted in the main body of the device and it is retained in this place by a mechanical manner.
- 30 5. The retractable antenna (6) according to the claim 3, wherein it can be alternatively extended automatically, with the assistance of a small electric motor which is incorporated in the device. This electric motor is activated when the user presses the "activation key", which is a large key placed in the upper part of the device and which serves also for setting the device in the phase of conversation.
- 35 6. The device according to the claim 1, wherein in its upper part there is a special housing (3), in which the earphone (2) is placed, when the device is in the phase of waiting for an incoming call and the antenna (6) is shortened.

7. The device according to the claim 1, wherein the second removable back surface of the device on which the straps are connected is formed of a flat, hard plastic material and it has the same dimensions and form with the original back surface of the device (or with a part of it).

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8. The device according to the claim 1, wherein the straps are alternatively connected on the removable battery of the device, which is placed in the rear part of the device. This battery can be replaced with an alternative one that does not brings any straps, and consequently the device can be easily separated from the straps.

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9. The device according to the claim 1, wherein the antenna that is incorporated in -the strap has the form of a flexible oblong lamina (20). Alternatively it has the form of an externally insulated thin wire (21) that runs across the strap in a vertical direction compared to its oblong axis, forming multiple folding of S type. A thin and flexible plaque of metal (18) lies under the antenna, aiming to restrict the negative influence of the body of the user on the functioning of the antenna. A thin insulation (19) comes in between the antenna and the underlying plaque.

15

20

10. The device according to the claim 1, wherein it can be carried out fastened to the wrist and during the phase of conversation, the user can speak and hear at the same time, without removing the device from the place where it is fastened, and without using additional accessories for this purpose.

## AMENDED CLAIMS

[received by the International Bureau on 05 October 1999 (05.10.99);  
Original claims 1-10 replaced by new claims 1-7; (1 page)]

1. A mobile phone device which can be fastened to the wrist of the user, by means of  
5 straps, said device comprising:  
Instead of an incorporated speaker, there is a small external earphone (2) which is  
connected through a joint (7) with the top of an extending mechanism, resembling to a  
retractable antenna (6), which can work also as a receiving antenna, and which is extended  
10 from the upper surface of the device. (The upper surface is that one facing towards the  
palm while the device is fastened to the wrist).
2. The device according to the claim 1, wherein the retractable antenna (6) is formed of  
one or more retracting parts of a hollow tube consisted of a semi-flexible conductible  
15 material.
3. The retractable antenna (6) according to the claim 2, wherein it can be extended with  
the assistance of a spring that is found in its track. During the waiting phase, the antenna  
(6) is retracted in the main body of the device and it is retained in this place by a  
20 mechanical manner.
4. The retractable antenna (6) according to the claim 2, wherein it can be alternatively  
extended automatically, with the assistance of a small electric motor which is incorporated  
in the device. This electric motor is activated when the user presses the "activation key",  
which is a large key placed in the upper part of the device and which serves also for setting  
25 the device in the phase of conversation.
5. The device according to the claim 1, wherein the straps are connected on a second  
removable back surface of the device, which is formed of a flat, hard material and it has  
the same dimensions and form with the original back surface of the device or with a part  
30 of it.
6. The device according to the claim 1, wherein the straps are alternatively connected on  
the removable battery of the device, which is placed in the rear part of the device.  
This battery can be replaced with an alternative one that does not brings any straps, and  
35 consequently the device can be easily separated from the straps.
7. The device according to the claim 1, wherein there is an antenna incorporated in the  
straps, which has the form of a flexible oblong lamina (20). Alternatively it has the form of  
an externally insulated thin wire (21) that runs across the strap in a vertical direction  
40 compared to its oblong axis, forming multiple folding of S type. A thin and flexible plaque  
of metal (18) lies under the antenna, aiming to restrict the negative influence of the body  
of the user on the functioning of the antenna. A thin insulation (19) comes in between the  
antenna and the underlying plaque.

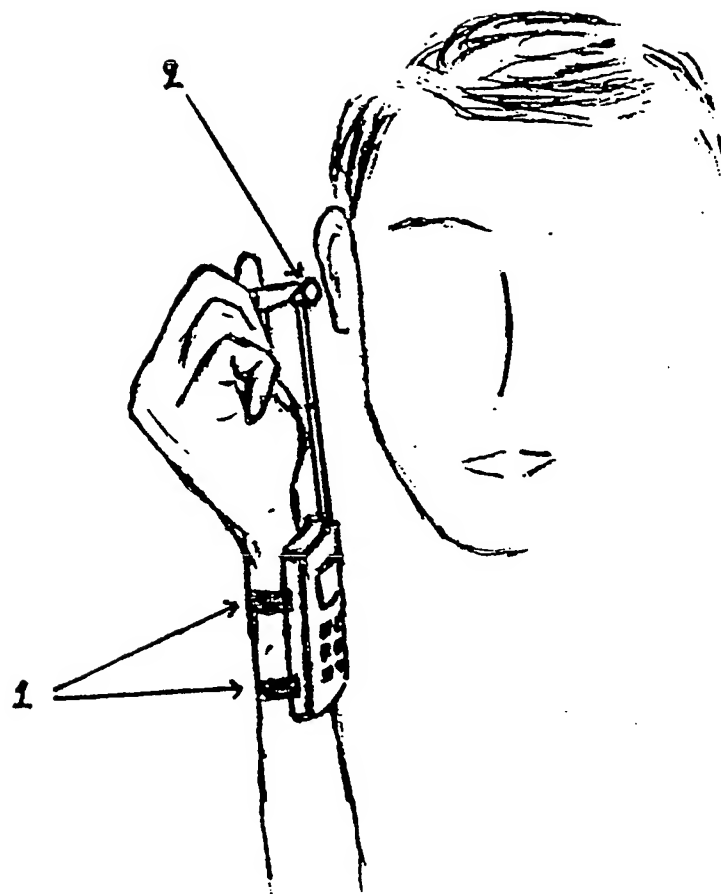


Figure 1



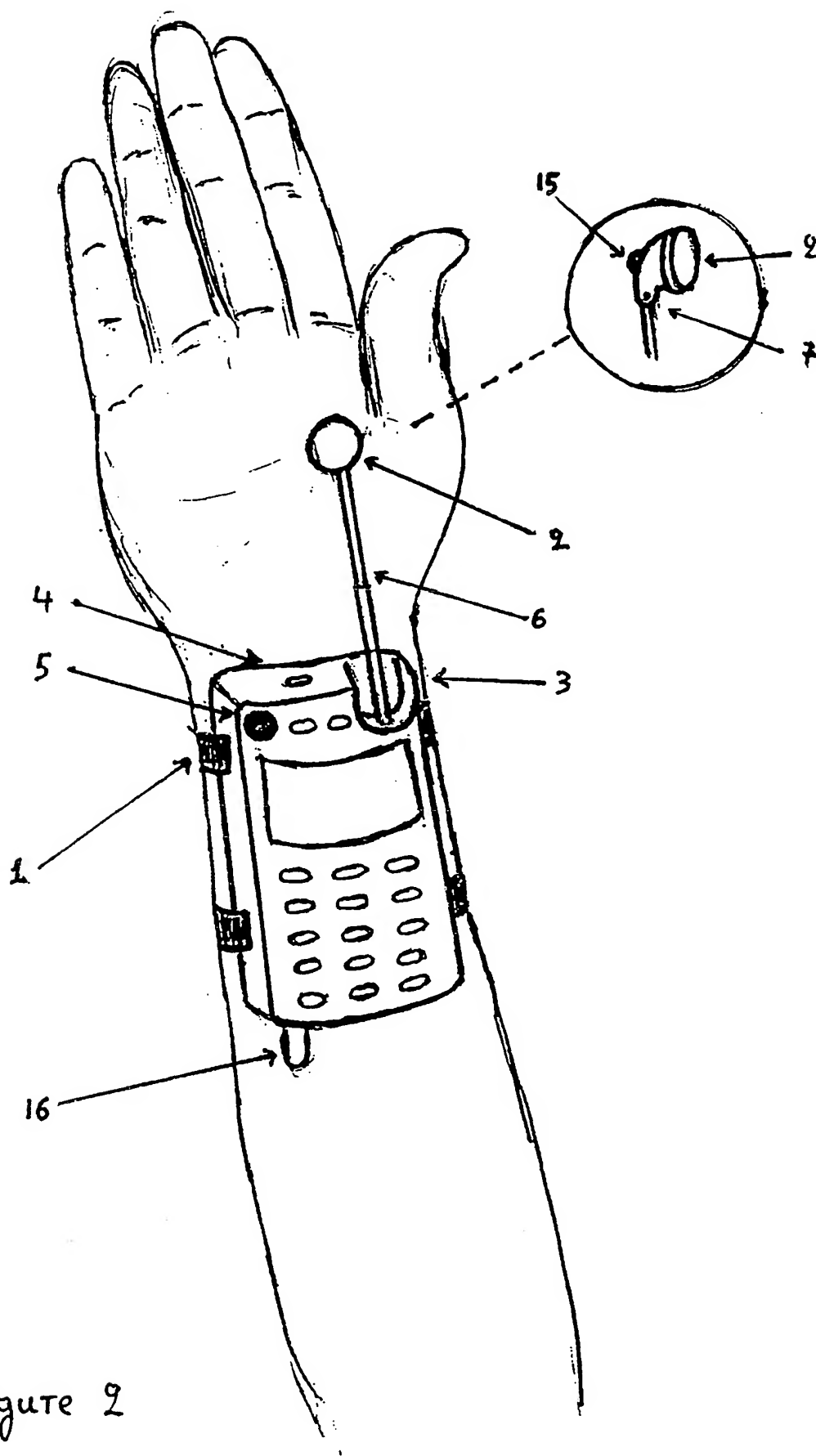


Figure 2

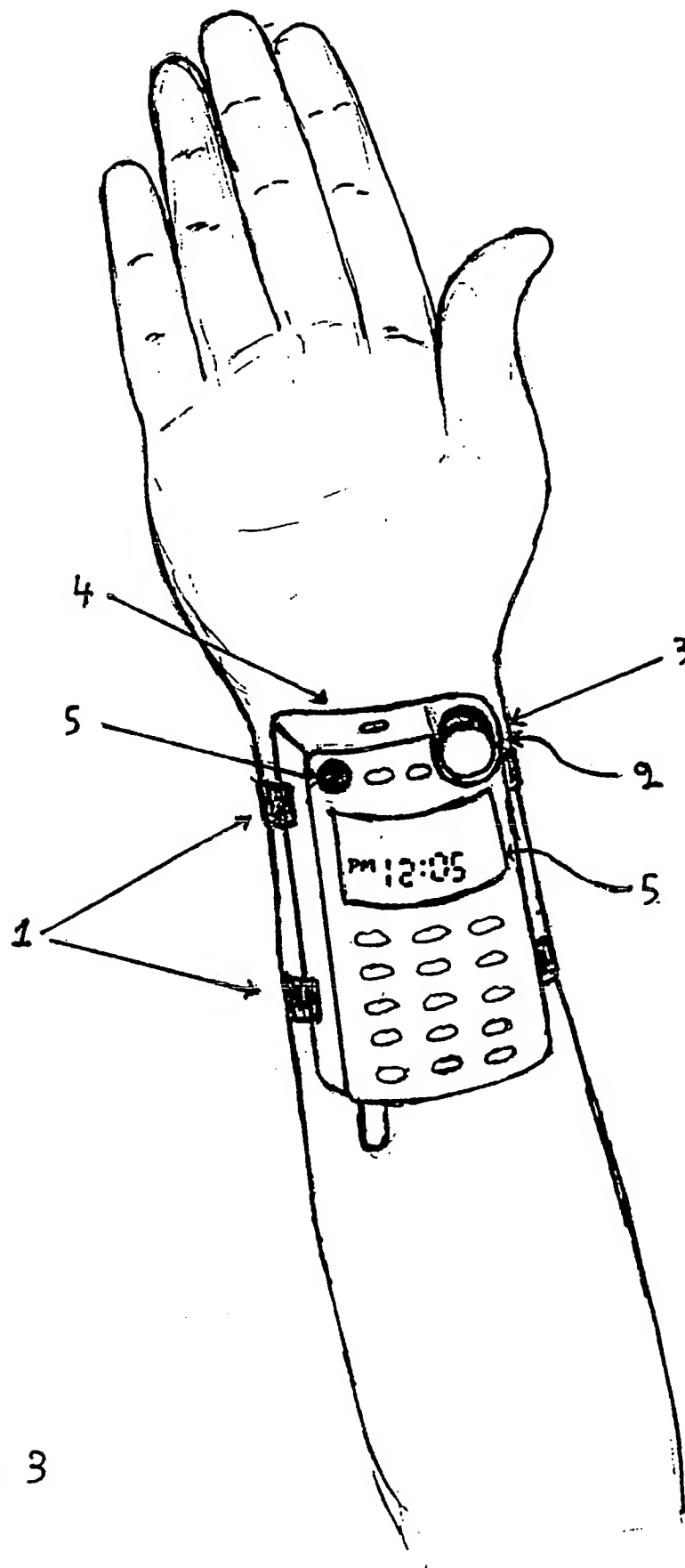


Figure 3

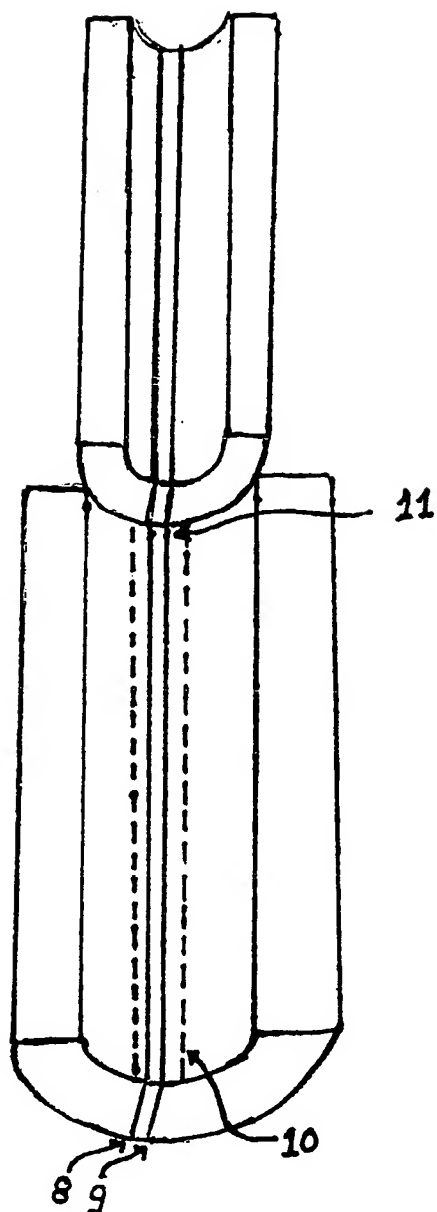


Figure 4

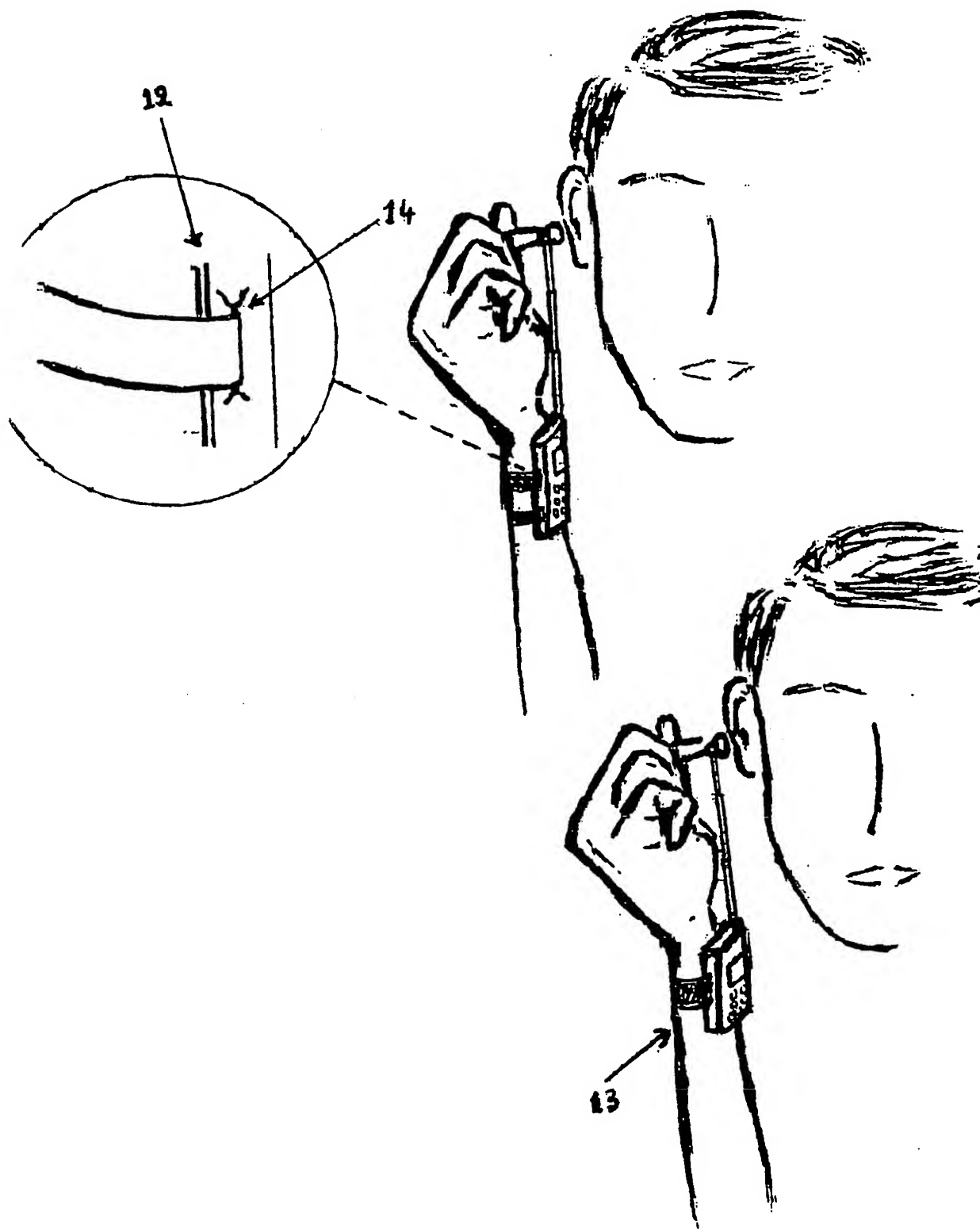


Figure 5

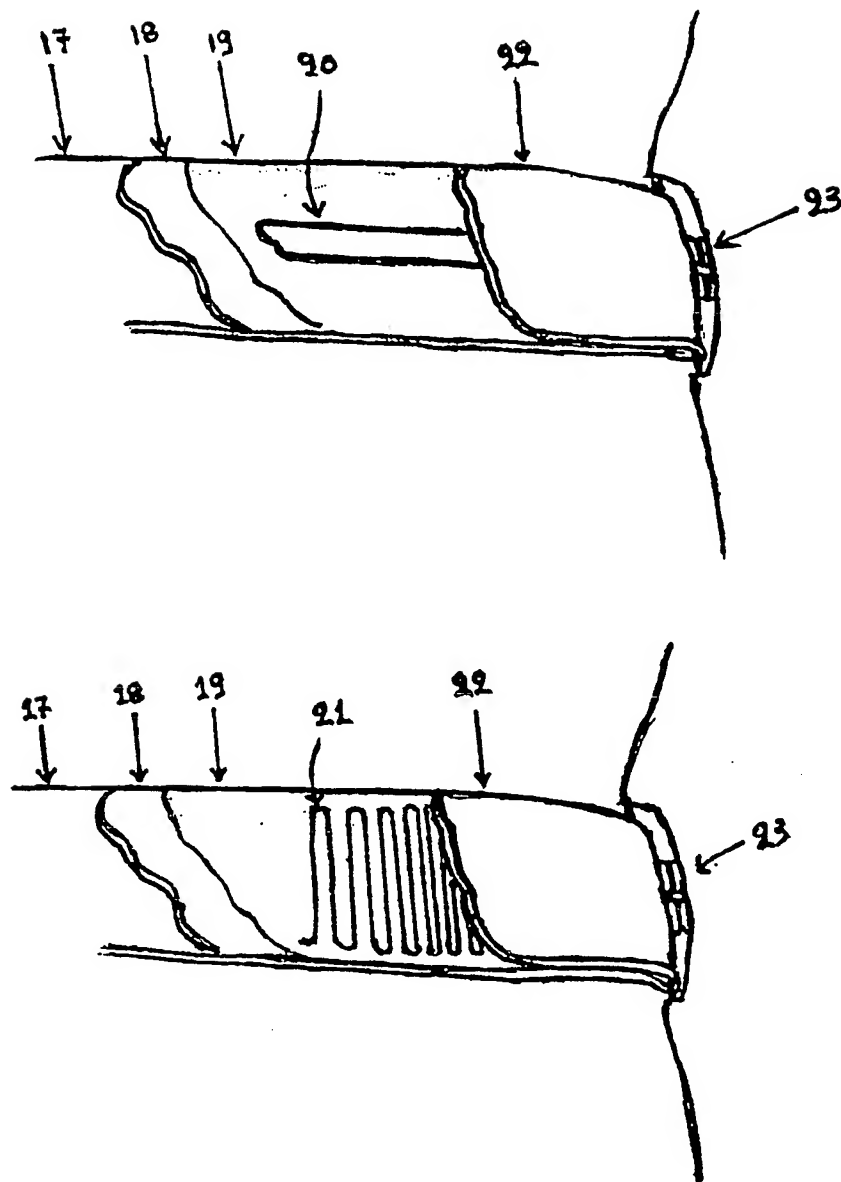


Figure 6

# INTERNATIONAL SEARCH REPORT

Int'l. Application No

PCT/GR 99/00018

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04M1/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04M H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 681 391 A (AT & T CORP) 8 November 1995 (1995-11-08)	1,2,6,10
A	column 2, line 39 - column 5, line 39; figures 1-7	9
A	WO 97 48222 A (FERNANDEZ MARTINEZ) 18 December 1997 (1997-12-18) page 4, line 7 - page 8, line 10; figures 1-5	1,2,7,10
A	WO 96 33569 A (FERNANDEZ MARTINEZ) 24 October 1996 (1996-10-24) page 4, line 8 - page 5, line 21; figures 1-7	1,2,7,10
	-/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

### \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "&" document member of the same patent family

Date of the actual completion of the international search

3 August 1999

Date of mailing of the international search report

12/08/1999

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# INTERNATIONAL SEARCH REPORT

Int lonal Application No  
PCT/GR 99/00018

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5 497 506 A (TAKEYASU ) 5 March 1996 (1996-03-05) * Abstract , figure 2 * ----	3-5
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P,X	WO 98 27702 A (GHASSABIAN ) 25 June 1998 (1998-06-25) page 7 - page 12; figures 1-5 -----	1,2,10

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